

A paradigm for biomonitoring

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Exposure to toxic substances

- Laboratory measurement
- Substances or their metabolites in human specimens

Biomarkers

- Presence of environmental chemicals in human tissue
- Early (pre-clinical) biological effects from environmental exposures

Complementary strategies

- **Episodic** exposure assessment studies in defined population
- **Continuous** monitoring of entire population

Episodic biomonitoring: Two contexts

- Known (or suspected): cluster of cases of “environmental disease”
 - Unknown: whether any specific environmental chemicals might be implicated
- Known (or suspected): environmental hazard
 - Unknown: whether any specific environmental chemicals have accumulated in human tissue

Episodic biomonitoring: A high-profile example

- Early detection of possible chemical terrorist attack
 - “All hazards” approach at state and federal public health laboratories

Episodic: key features

- Point in time
- Defined population
- Limited scope

Continuous monitoring of the entire population

- Objectives
 - track exposure levels to specific environmental chemicals in the general population
 - find cases of elevated exposures which represent levels of immediate public health concern

Continuous: Three mechanisms

- Electronic laboratory reporting of notifiable conditions
- Convenience sampling
- State Report on Human Exposure to Environmental Chemicals
 - State-HANES

Electronic laboratory reporting

- NEDSS-PHIN
- Examples
 - Lead exposure blood test results
 - Pesticide exposure blood test results
 - Carbon monoxide exposure blood test results
 - Nitrate exposure blood test results
- Automated alerts when test results exceed pre-defined thresholds

Convenience sampling

- Second use of samples collected for another purpose
- May not represent a truly random cross-section of the population
- “Sentinel surveillance” may function as an early warning system
- Focus on vulnerable population groups

Convenience samples

- Discarded blood from routine blood tests
- Discarded urine from routine urine tests
- Placental tissue
- Tissue samples collected during surgical procedures
- Tissue samples collected during routine autopsy

State Report on Human Exposure to Environmental Chemicals

- “State-HANES”
- Routine on-going assessment of exposure to environmental chemicals in the general population

Paradigm for biomonitoring

- **Episodic** exposure assessment studies
 - environmental disease
 - environmental hazard
- **Continuous** monitoring of entire population
 - Electronic laboratory reporting of notifiable conditions
 - Convenience sampling
 - State Report on Human Exposure to Environmental Chemicals (“State-HANES”)

State-HANES Intergovernmental Planning Project

- Activities
 - Goals
 - Financing options
 - Topics
 - Operations
 - Data analysis & dissemination
- Timeline

State-HANES: Draft goals

- To estimate the number and percent of persons in a state/local population and in designated population subgroups with selected health effects, exposures, behaviors, or other important determinants of health
- To monitor trends and patterns in selected health effects, exposures, behaviors, and other important determinants of health
- To identify and evaluate risk factors for selected health effects and exposures
- To collect data on unique state and local health priorities but whenever possible in a manner that is comparable across states and localities

